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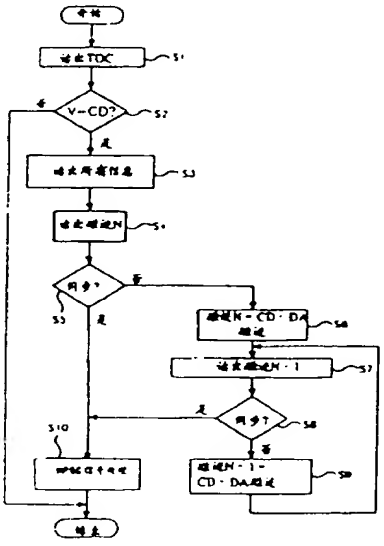
[54]发明名称 用于激光视盘记录/再现系统搜索不同磁迹方法及其装置

[57]摘要

一种自动搜索选择地分配在 V-CD 中不同磁迹的方法及装置，其根据对 V-CD 记录/再现系统中的 V-CD 是否检测到一个 CD-ROMXA 同步信号而进行，通过读出光盘引入区的 TOC 数据，鉴别装入光盘的种类，在激光视盘情况下根据激光视盘的同步信号是否容易地被检测到，来检查不同磁迹例如 CD-DA 磁迹是否被包含在激光视盘中。因此，不仅音频光盘（CD）、激光图示唱盘（CDG）、激光视盘（V-CD）能容易地被再现，而且具有 CD-DA 磁迹的激光视盘也能容易地被再现。



权 利 要 求 书

1、一种在激光视盘即V－CD再现系统中使用光拾取器搜索不同磁迹的方法，所述的方法包括步骤为：

读出在激光视盘记录/再现系统中装入的光盘引入区上记录的目录表数据；

根据在激光视盘上读出的目录表数据判定光盘是否是激光视盘，根据包含在目录表数据中的磁迹号和磁迹再现时间信息读出激光视盘的信息，和使光拾取器移到激光视盘中最末磁迹，以及当光盘是激光视盘时读出记录在最末磁迹上的数据；和

判定激光视盘的CD－ROM XA同步信号是否从该最后磁迹读出的数据中检测，当CD－ROM XA同步信号被检测到时，该最末磁迹被判定为，在该磁迹上通过MPEG处理记录MPEG音频/视频信号，并且对照激光视盘处理音频/视频信号，而当CD－ROM XA同步信号没有被检测到时，该最末磁迹被判定为不同磁迹，使光拾取器移到最末磁迹以内的磁迹，读出记录在内磁迹上的数据；和

判定激光视盘的CD－ROM XA同步信号是否从内部磁迹读出数据中被检测的，当CD－ROM XA同步信号被检测到时，该内部磁迹被判定为，在该磁迹上由MPEG处理记录MPEG音频/视频信号，和对照激光视盘处理音频/视频信号，和当CD－ROM XA同步信号没有被检测到时，该内部磁迹被判定为不同磁迹，以便光拾取器移到最末磁迹以内的磁迹，以返转到读出记录在内部磁迹上的数据的步骤。

2、一种用于激光视盘的搜索不同磁迹的装置，所述装置包括：

数据读出装置，用于从装在激光视盘记录/再现系统中的光盘，读出记录的信息数据，以输出音频/视频数据读出信号；

前置放大器，用于放大由数据读出装置提供的音频/视频数据读出信号，以输出放大的信号；

数字信号处理器，用于数字处理来自所述前置放大器的放大信号，以输出第一数字信信号；第二数字信号，第三数字信号和第四数字信号；

CDG编码器，用于编码来自所述的数字信号处理器的第一数字信号，以输出编码的CDG信号；

第一D/A变换器，用于将来自所述数字信号处理器的第二数字信号和第四数字信号分别变换成第一模拟信号和第二模拟信号；

MPEG处理部分，用于通过MPEG算法，处理来自所述数字信号处理器的第三数字信号，以输出MPEG音频/视频信号；

开关，用于在来自所述CDG编码器的CDG信号和来自所述MPEG处理部分的MPEG视频信号之间转换，以输出用于显示设备的视频信号，和用于在来自所述的第一A/D变换器的第一模拟信号及第二模拟信号和来自所述的MPEG处理部分的MPEG音频信号之间转换，以输出用于声音产生设备的音频信号；和

控制部分，用于控制所述数据读出装置、所述数字信号处理器、所述MPEG处理部分和所述开关的操作，用于根据光盘的目录表数据鉴别装入光盘的类型，该目录表是从所述数据读出装置经过数字信号处理器提供的，当光盘是激光视盘时，根据激光视盘的CD－ROM XA同步信号是否被检测到，用于搜索不同磁迹是否被分配在激光视盘上。

3、根据权利要求2所述用于激光视盘的搜索不同磁迹的装置，其中，该第一数字信号是激光图示唱盘信号，第二数字信号和第一模拟信号二者是音频－CD信号，第三数字信号是用于激光视盘的MPEG音频/视频信号，第四数字信号和第二模拟信号是激光视盘的CD－DA磁迹信号。

说 明 书

用于激光视盘记录/再现系统搜索不同磁迹方法及其装置

本发明涉及一种激光视盘(后面称为“V－CD”)记录/再现系统，特别涉及一种用于V－CD记录/再现系统根据对V－CD检测CD－ROM XA(扩充的运算)同步信号是否在V－CD中，来自动地搜索不同的磁迹，例如数字音频小形盘(后面称为“CD－DA”)的方法及其装置。

在光盘的领域中，小型盘(Compact discs)广泛地用作信息记录介质，其中记录大量音频信息。在以盘型的信息记录介质中，音频小型盘(audio compact disc)(后面称为“CD”)首次被研制。在其上记录有图形(graphic)信息和音频信息的激光图示唱盘(compact disc graphics)(后面称为“CDG”)和在其上记录运动图象信息和音频信息的V－CD(后面称为“V－CD”)被广泛地使用。

V－CD记录/再现系统不仅能用作再现V－CD而且也能再现音频CD和CDG的复合产品。为了在盘上记录不同的信息，对每个盘应用特有的不同信息处理方法。

首先，记录在CD的音频信息数据可通过使用记录在P和Q通道的节目(program)数据再现。记录在CDG上的信息数据可通过使用记录在P和Q通道中的音频信息数据和记录在R到 W通道中的图形信息数据再现。由于记录在V－CD的音频信息数据和视频信息数据用MPEG算法

被压缩和在记录期间记录，当重放操作期间，这些数据可通过MPEG音频/视频解码器解码压缩的音频/视频信息数据来重现。

V－CD也包括在其上记录了不同信息数据的不同磁迹，它具有与选择地记录了一般V－CD信息数据的CD－ROM XA磁迹的不同数据格式。例如，至少一条磁迹选择地被分配作为位于V－CD上最末磁迹以内的CD－DA磁迹，其中MPEG音频/视频信号已用MPEG算法处理和记录。在CD－DA磁迹被分配在V－CD的情况下，必需检查CD－DA磁迹的分配状态和为响应该检查正确地再现信息数据。美国专利No.5,321,677描述了上面所述的对记录在V－CD的不同磁迹中的各种信息数据进行搜索的方法的实施例。

在V－CD中具有在其上记录了信息数据的MPEG格式磁迹和不同的磁迹例如CD－DA磁迹，根据搜索不同磁迹的通常方法，该CD－DA磁迹的鉴别是通过在附加存储位置，例如静态随机存取存储器(SRAM)存储的主音量描述符(PVD)来鉴别的。然而，通常方法的问题在于：搜索不同磁迹的过程复杂和耗费时间。

因此，本发明的第一个目的是提供一种能自动搜索选择地分配在V－CD中不同磁迹的方法，它是根据对V－CD记录/再现系统中的V－CD是否检测到一个CD－ROM XA同步信号而进行的。

本发明的第二个目的是提供一种能自动搜索选择地分配在V－CD中不同磁迹的装置，它是根据对V－CD记录/再现系统中的V－CD是否检测到一个CD－ROM XA同步信号而进行的。

为了实现上述本发明的第一目的，提供了一种使用光拾取器搜索激光视盘(V-CD)记录/再现系统中的不同磁迹的方法，该方法包括步骤为：读出装入激光视盘(V-CD)记录/再现系统的光盘引入区域

中记录的目录表数据;

根据在激光视盘(V-CD)上读出的目录表数据判定光盘是否是激光视盘，当光盘是激光视盘时，根据包含在目录表数据中的磁迹号和磁迹再现时间信息读出激光视盘的信息和使光拾取器移到激光视盘中最末的磁迹和读出记录在最末磁迹上的数据。

判定激光视盘的CD－ROM XA同步信号是否从最末磁迹读出数据中被检测，当CD－ROM XA同步信号被检测到时，该最末磁迹被判定，其上记录的MPEG音频/视频信号是由MPEG处理记录的，并对照激光视盘处理音频/视频信号，当CD－ROM XA同步信号没有被检测到时，最后磁迹被判定为不同磁迹，以便光拾取器被移动到最末磁迹以内的磁迹，以读出记录在内部磁迹上的数据；和

对被检测的激光视盘判定盘的CD－ROM XA同步信号是否从内部磁迹的读出数据中被检测，当CD－ROM XA同步信号被检测到时，该内部磁迹判定为在其上记录的MPEG音频/视频信号是用MPEG处理记录的，并对照激光视盘处理音频/视频信号，当CD－ROM XA同步信号没有被检测到时，内部磁迹判定为不同磁迹，以便光拾取器移到最末磁迹以内的磁迹，以返回到读出记录在内部磁迹的数据的步骤。

为了实现上述本发明的第二目的，提供一种用于在激光视盘(V-CD)记录/再现系统中搜索不同磁迹的装置，该装置包括:

数据读出装置，用于从加载在激光视盘(V-CD)记录/再现系统中的光盘上，读出记录的信息数据，以输出音频/视频数据读出信号;

前置放大器，用于放大由数据读出装置提供的音频/视频数据读出信号，以输出放大的信号;

数字信号处理器，用于数字处理从前置放大器来的放大信号，

以输出第一数字信号、第二数字信号、第三数字信号和第四数字信号;

CDG编码器，用于编码从数字信号处理器来的第一数字信号，以输出编码的CDG信号;

第一D/A变换器，用于把从数字信号处理器来的第二数字信号和第四数字信号分别变换为第一模拟信号和第二模拟信号;

MPEG处理部分，用于处理从使用MPEG算法的数字信号处理器来的第三数字信号，以输出MPEG音频/视频信号;

开关，用于在来自CDG编码器的CDG信号和来自MPEG处理部分的MPEG视频信号之间转换，以输出用于显示设备的视频信号，和用于在来自第一D/A变换器的第一模拟信号及第二模拟信号和来自MPEG处理部分的MPEG音频信号之间转换，以输出用于声音产生设备的音频信号；和

控制部分，用于控制数字读出装置、数字信号处理器、MPEG处理部分和开关的操作，用于根据光盘的目录表数据鉴别装入盘的类型，目录表是通过数字信号处理器从数据读出装置提供的，和当光盘是激光视盘时，根据用于激光视盘的CD－ROM XA同步信号是否被检测到，以搜索不同磁迹是否被分配在激光视盘上。

最好是，第一数字信号是激光图示唱盘(compact disc graphic)信号，第二数字信号和第一模拟信号二者是音频小型盘(Audio compact disc)信号，第三数字信号是用于激光视盘的MPEG音频/视频信号，第四数字信号和第二模拟信号是激光视盘的CD－DA信号，

不同磁迹的搜索方法和装置，通过读出在光盘引入端记录的TOC数据判定装载的光盘是那种类型的盘，在V－CD情况下，根据V

－CD的同步信号是否容易检测来检查包含在V－CD中例如CD－DA磁迹中的不同磁迹。

因此，本发明不仅可用于再现音频CD、CDG、V－CD而且还再现具有CD－DA磁迹的V－CD。

通过结合附图详细地描述优选实施例，本发明的上述目的和优点将变得显见。

附图简要说明

图1是用于说明使用在本发明中的V－CD数据格式的示意图；

图2A是用于说明通常CD的扇区结构图；

图2B是说明图2A中所示相对于CD－DA磁迹扇区的数据格式示意图；

图2C是说明图2A所示相对于V－CD的CD－ROM XA磁迹扇区的数据格式示意图；

图3是用于表示根据本发明的一个实施例在V－CD记录/再现系统中搜索不同磁迹的装置的结构方框图；和

图4是用于说明根据本发明的一个实施例在V－CD记录/再现系统中搜索不同磁迹的方法的流程图。

下面将结合附图对根据本发明的实施例的用于V－CD记录/再现系统和其装置的机械结构、电路结构和搜索　不同磁迹方法的操作进行详细地描述。

图1是用于说明使用在本发明中的V－CD的数据格式示意图。参照图1，　通常V－CD具有引入区，其中目录表(后面称为“TOC”)数据被V－CD记录/再现系统再现，节目(program)区具有至少一个记录MPEG音频/视频数据的磁迹和至少一个不同的磁迹，　例如CD－DA磁

这种引出区，该节目区至少有一个磁迹。第一磁迹包括PVD区，如V－CD数据磁迹，在相应盘上记录视一唱(Video－song)信息状态中形成的卡拉OK信息区(KIA)、V－CD信息区、片段重放项目(SPI)区和CD－I(交互性)应用区。用MPEG算法压缩的MPEG音频/视频数据记录在磁迹2到磁迹N。根据一种情况，即至少一个不同的磁迹可以分配在磁迹N的内部的情况，在其中记录CD－DA信息数据例如记录CD－DA磁迹。

图2A表示在一般CD中扇区的结构。参照图2A，每个CD的扇区被分为75个区和用于再现一秒钟。

图2B是用于说明对应于图2A所示CD－DA磁迹，每个扇区的数据格式示意图，参照图2B、一个CD－DA磁迹是由音频数据(2352字节)组成的。

图2C是用于说明对于图2A所示V－CD的CD－ROM XA磁迹，每个扇区的数据格式示意图，参照图2C，一个V－CD的CD－ROM XA磁迹如CD－DA磁迹具有2352字节，该磁迹由同步信号(12字节)、标题数据(4字节)、子标题数据(8字节)、用户数据(324字节)和错误检测码EDC(4字节)。

图3是用于表示根据本发明的V－CD记录/再现系统中搜索不同轨迹的装置的结构方框图。参照图3、标号100表示由V－CD记录/再现系统再现的光盘。数据读出部分31包括：主轴电机311、伺服电路312和光学拾取器313、它从光盘100读出记录的信息数据和输出RF MPEG音频/视频读出信号314。在后面所描述的控制部分38的控制操作下主轴电机311以恒速转动光盘100，以致于光盘100被正常地再现。光拾取器313从以恒速旋转的光盘100读出信息。伺服电路312控制主轴电机411的驱动和光拾取器313的移动。

前置放大器32放大从光拾取器313提取的音频/视频数据读出信号314和输出该放大的信号321。

数据信号处理器(DSP)33数字处理来自前置放大器32的已放大信号321和输出CDG信号331、 音频CD信号332、 记录在V－CD上的MPEG音频/视频信号333和在分配在V－CD中的CD－DA磁迹情况下的CD－DA信号334。

CDG编码器34编码来自DSP 33的CDG信号331并输出编码的CDG信号341。

第一D/A变换器35分别将分配在V－CD 334的音频CD信号4511和CD－DA磁迹信号334变换成第一模拟信号351和第二模拟信号3511。

MPEG处理部分36包括CD－ROM解码器361 MPEG音频解码器362、第二D/A变换器363、 MPEG音频解码器364和视频信号变换器/编码365、它用MPEG算法处理由DSP 33提供的V－CD的MPEG音频/视频信号333并输出第一MPEG信号3631和第二MPEG信号3651。CD－ROM解码器361解码适于CD－ROM数据格式的MPEG音频/视频信号333，并输出解码的MPEG信号3611。 MPEG音频解码器362根据预定音频同步时钟通过CD－ROM解码器361解码CD－ROM解码的MPEG信号3611的MPEG音频信号36111并输出解码的MPEG音频信号3621。 第二D/A变换器363模拟变换由MPEG音频解码器361解码的MPEG音频信号3621并输出已模拟变换的MPEG音频信号3631。 MPEG视频解码器364根据预定视频同步时钟通过CD－ROM解码器361解码CD－ROM解码的MPEG信号3611的MPEG视频信号36112并输出解码的MPEG视频信号3641。 视频信号变换器/编码器365模拟变换来自视频解码器364的解码的MPEG视频信号3641并将其编码， 以输出经模拟变换/编码的MPEG视频信号

3651。

开关37在来自CDG编码器34的编码CDG信号341和来自MPEG处理部分36的经模拟变换/编码的MPEG视频信号3651之间转换，以输出用于显示设备的视频信号，和在来自第一D/A变换器35的第一信号351及第二信号3511和来自MPEG处理部分36的经模拟变换的MPEG音频信号3631之间变换，以输出应用于声音产生设备的音频信号。

控制部分38控制数据读出部分31、DSP 33、MPEG处理部分36和开关37的操作，根据光盘100的TOC数据鉴别装载的光盘100的类型，TOC数据从数据读出部分31通过DSP 33提供，当光盘100是V－CD时根据V－CD的CD－ROM XA同步信号是否被检测到来搜索不同磁迹是否被分配在V－CD上。TOC数据是从数据读出部分31通过DSP 33提供的。

下面将对上面所述的V－CD记录/再现系统搜索不同磁迹装置的操作予以详细说明。

首先，光盘100由用户装载在V－CD记录/再现系统4上。然后，根据来自数据读出部分31的伺服电路312的主轴控制信号3121，主轴电机311在控制部分38的控制下旋转光盘100。

因此，光拾取器313读出记录在光盘100的引入区的TOC数据并输出RF TOC读出信号314。

然后，前置放大器32放大来自光拾取器313的TOC读出信号314并输出已放大的TOC信号321。然后，DPS 33将已放大的TOC信号320处理成数字TOC信号，然后，控制部分38从数字TOC信号中检查在子码Q通道中的AO的SPEC是否是表示CD－ROM XA的＄20。

其结果判定，如果光盘100是CDG，CDG编码器34编码从数据读出部分31经过DPS 33提供的信号331并输出CDG信号341作为屏幕显

示信号。然后，CDG信号341在控制部分38控制下通过开关37输出。

判定的结果，如果光盘100是音频CD，第一D/A变换器35模拟变换通过来自数据读出部分31的经过DPS 33提供的CD记录信息信号331并输出经模拟变换的信号351。然后，在控制部分38的控制下，通过开关37输出经模拟变换的信号351。

另一方面，当控制部分38从数字TOC信号中检测在子码Q通道中AO的PSEC是否是$20时，如果光盘100是V－CD，控制部分38控制转换路经开关37转向MPEG处理部分36，然后，光拾取器313使用在磁迹1中的PVD区执行重放操作。

即，光拾取器313从V－CD读出记录的数据并输出音频/视频读出信号314。然后，前置放大器32放大来自光拾取器313的音频/视频数据读出信号314。并输出已放大的信号321。DSP 33数字处理来自前置放大器32的已放大信号321并输出MPEG音频/视频信号。

接着，CD－ROM解码器361解码适合于CD－ROM数据格式的MPEG音频/视频信号333并输出解码的MPEG信号3611。

MPEG音频解码器362根据预定的音频同步时钟经过CD－ROM解码器361解码CD－ROM解码的MPEG信号3611的MPEG音频信号36111并输出解码的MPEG音频信号3621。第二D/A变换器363由MPEG音频解码器361模拟变换解码的MPEG音频信号3621并输出经过声音输出设备(未示出)输出模拟变换的MPEG音频信号3631。

而且，MPEG视频解码器364根据预定视频同步时钟经过CD－ROM解码器361解码CD－ROM解码的MPEG信号3611的MPEG视频信号36112并输出解码的MPEG视频信号3641。视频信号变换器/编码器363模拟变换来自MPEG视频解码器364的解码的MPEG视频信号3641作为显示

在CRT(未示出)上的R(红)、G(绿)、B(蓝)的彩色信号并将其编码作为图象显示信号并输出经模拟变换/编码的MPEG视频信号3651。因此，在控制部分38的控制下，经模拟变换/编码的MPEG视频信号3651经过开关37输出。

开关37在来自CDG编码器34的编码CDG信号341和来自MPEG处理部分36的经模拟变换/编码的MPEG视频信号3651之间转换，以输出用于显示设备的视频信号，和在来自第一D/A变换器35的音频CD信号351及CD－DA信号和来自所述的MPEG处理部分36的经模拟变换的MPEG音频信号3631之间转换，以输出用于声音产生设备的音频信号。

下面参考图4将对根据本发明实施的V－CD记录/再现系统搜索不同磁迹的方法的操作进行详细地说明。

如果光盘100由用户装入V－CD记录/再现系统，在步骤S1，光拾取器313在控制部分38的控制下读出记录在光盘100的引入区中的TOC数据。

在步骤S2，控制部分38从读出的TOC数据中检查在子码的Q通道中AO的PSEC是否是表示CD－ROM XA的＄20。

在步骤S1判定的结果，如果AO的PSEC＝＄20，在步骤S3，光盘100判定为V－CD和控制部分38根据磁迹号和包含在TOC数据中的磁迹再现时间信息识别V－CD的信息。

接着，控制部分38通过控制伺服电路312使光拾取器313移到V－CD的最末磁迹，即磁迹N，由此在步骤S4，光拾取器313读出记录在磁迹N中的数据。根据该数据，读出的数据经RF放大器32放大和由DSP 33处理。

然后，在步骤S5，控制部分38检测V－CD的CD－ROM XA同步信

号是否由DSP 33提供的RF信号中被检测到。

在步骤S5检测的结果，如果V－CD的CD－ROM XA同步信号是从DSP提供的信号中检测的，该磁迹N判定为在其上记录由MPEG处理的MPEG音频/视频信息的轨迹。即在步骤S10，判断在V-CD上面不包括CD－DA磁迹。

另一方面，在步骤S5检查的结果，如果V－CD的CD－ROM XA同步信号没有从DSP提供的RF信号中检测到，该磁迹N判定为CD－DA磁迹(步骤S6)。使光拾取器313从读出数据的磁迹N移到磁迹N－1(步骤S7)和在步骤S8，检查V－CD的CD－ROM XA同步信号是否从磁迹N－1中被检测到。

在步骤S8检查的结果，如果V－CD的CD－ROM XA同步信号是从磁迹N－1中检测的，在步骤S10，磁迹N－1被判定是MPEG音频/视频信息的磁迹，并由此在步骤10由MPEG处理部分34处理。如果V－CD的CD－ROM XA同步信号不是从轨迹N－1中检测到，轨迹N－1判定为CD－DA轨迹(步骤S9)并转到步骤S7。然后控制部分38从轨迹N-1以内的磁迹，即磁迹N－2读出信息数据，和在步骤S8，检查V－CD的CD－ROM XA同步信号是否从轨迹N－2中检测到。

控制部分38检查在装入的V－CD上是否包含CD－DA磁迹。如果包含CD－DA磁迹，该CD－DA磁迹在控制部分38的控制下，经MPEG处理部分36到第一D/A变换器35的输出路经切换到开关37。

根据本发明，在V－CD记录/再现系统中，搜索不同磁迹的方法和装置，通过读出记录在光盘引入区的TOC数据判别已装入的光盘是哪一种类型的盘，在V－CD情况下，根据V－CD的同步信号是否容易地被检测来检查在V－CD中是否包含不同的磁迹，例如CD-DA磁迹。

因此，本发明可以用于不仅再现音频CD、CDG、V－CD、而且再现具有CD－DA磁迹的V－CD。

如上所述，虽然在这里已详细地描述了本发明的实施例，可以理解，本发明不限于这些精确的实施例，而本领域的技术人员可进行各种改进和修改，但不脱离本发明的构思和范围。

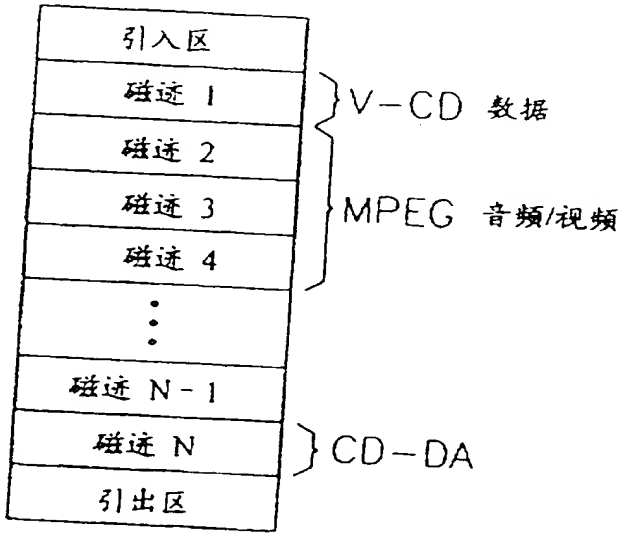


图 1

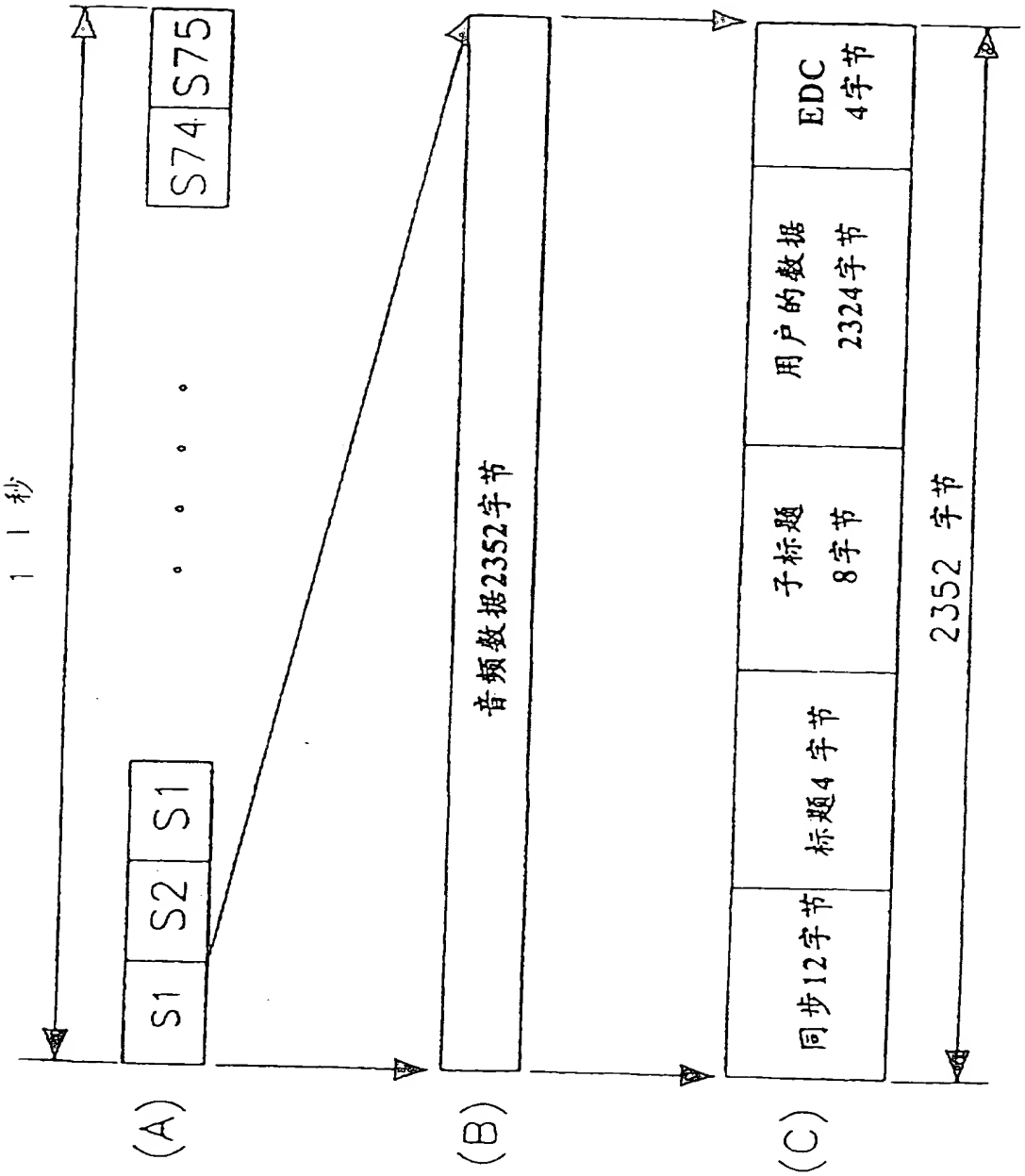

1 1 秒
S1
S2
S1
S74
S75
(A)
音频数据2352字节
(B)
同步12字节
标题4 字节
子标题
8字节
用户的数据
2324字节
EDC
4字节
2352 字节
(C)

图 2

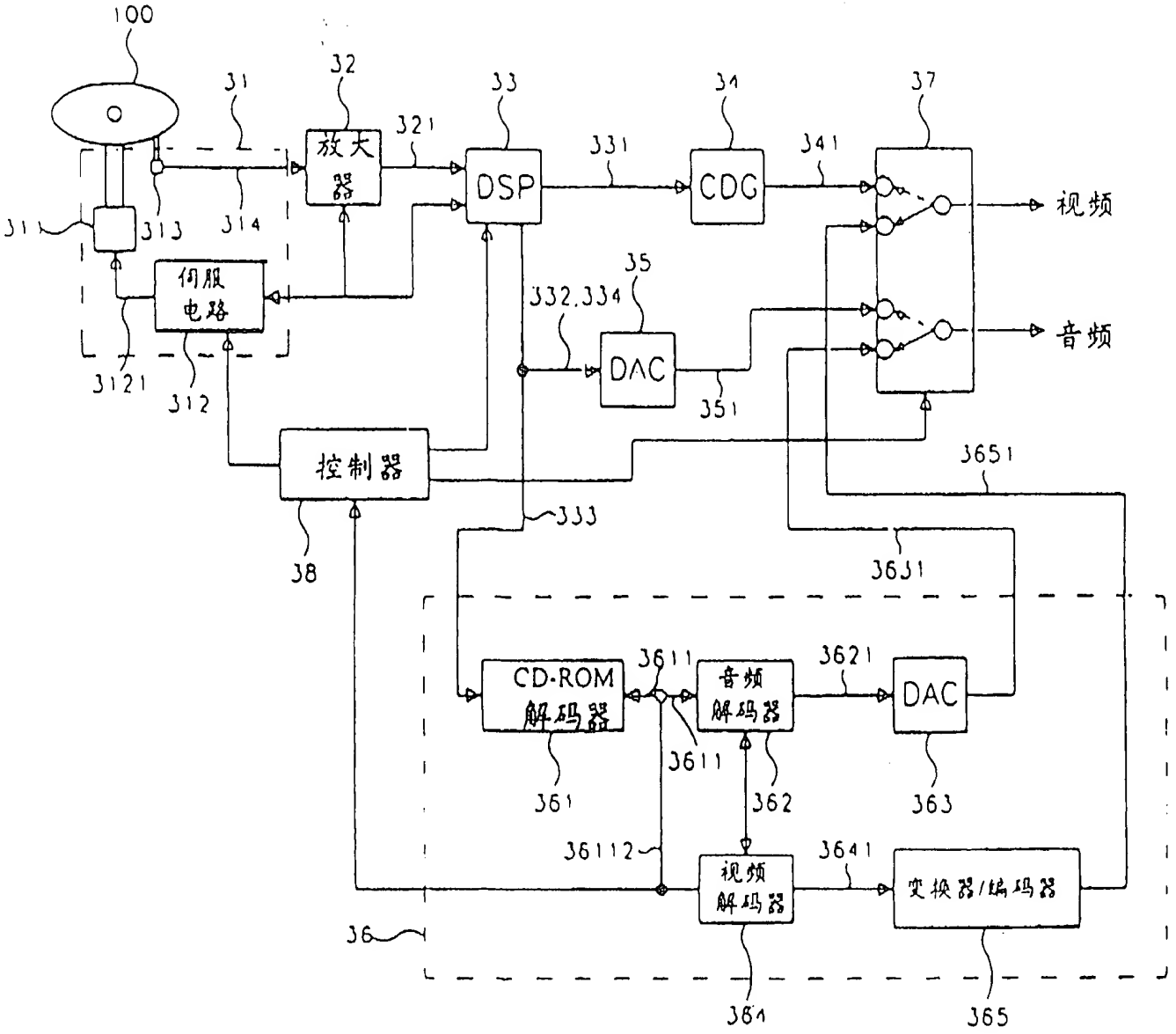

100
31
32
33
34
37
放大器
321
DSP
331
CDG
341
视频
311
313
314
伺服电路
35
332.334
音频
DAC
3121
312
351
控制器
3651
333
38
3631
CD-ROM解码器
3611
音频解码器
3621
DAC
3611
361
362
363
36112
视频解码器
3641
变换器/编码器
36
364
365

图 3

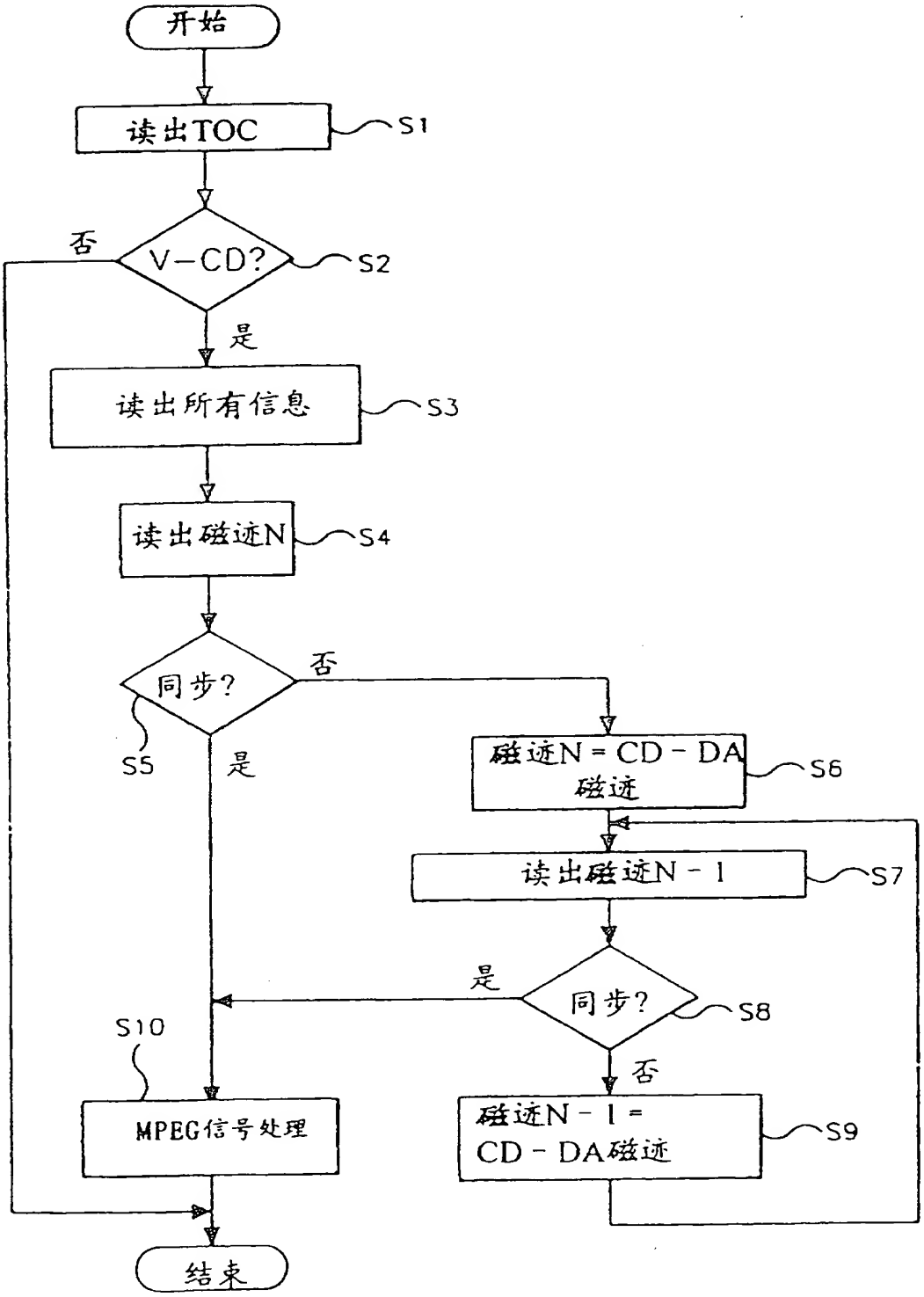

开始
读出TOC
S1
否
V-CD?
S2
是
读出所有信息
S3
读出磁迹N
S4
同步?
否
S5
是
磁迹N = CD - DA
磁迹
S6
读出磁迹N - 1
S7
是
同步?
S8
否
S10
MPEG信号处理
磁迹N - 1 =
CD - DA磁迹
S9
结束

图 4

Different track searching method for video compact disc recording/reproducing system and apparatus thereof

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Inventor: PARK CHAN-SOU (KR)

Applicant: DAE WOO ELECTRONICS CO LTD (KR)

Classification:

- international: G11B7/09

- european: G11B19/12; G11B27/10A1; G11B27/32D2; H04N5/85

Application number: CN19950121680 19951230

Priority number(s): KR19940039387 19941230

Also published as:

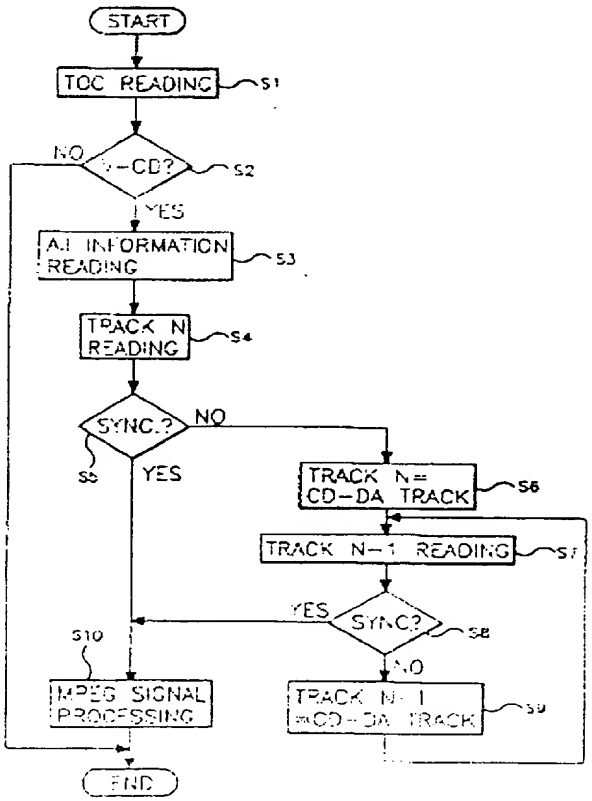
US5701384 (A1)

JP8235831 (A)

Abstract not available for CN1130787

Abstract of correspondent: **US5701384**

A method capable of automatically searching a different track such as compact disk-digital audio according to whether or not a CD-ROM XA synchronization signal is detected for a video compact disc in the video compact disc for a the video compact disc recording/reproducing system and apparatus thereof. The different track method and apparatus discriminates the kind of the loaded optical disc by reading TOC data recorded on the lead-in area of the optical disc, in case of the video compact disc, checks if a different track is contained in the video compact disc such as a CD-DA track in accordance with whether or not the synchronous signal for the video compact disc is detected easily. Therefore, not only an audio compact disc, a compact disc graphics disc, a video compact disc not also a video compact disc having a CD-DA track can be easily reproduced.



Different track searching method for video compact disc recording/reproducing system and apparatus thereof

Description of correspondent: **US5701384**

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a video compact disc (hereinafter referred to as "V-CD") recording/reproducing system, and more particularly, to a method capable of automatically searching a different track such as a compact disc-digital audio (hereinafter referred to as "CD-DA") according to whether a CD-ROM XA (extended architecture) synchronization signal is detected for V-CD in V-CD for the V-CD recording/reproducing system and apparatus thereof.

2. Description of the Prior Art

In the area of optical discs, compact discs are widely used as information recording media in which a large quantity of audio information is recorded. In information recording media in the form of a disc, an audio compact disc (hereinafter referred to as "CD") was developed for the first time. A compact disc graphics (hereinafter referred to as "CDG") disc on which graphic information and audio information are recorded, and V-CD (hereinafter referred to as "V-CD") on which motion image information and audio information are recorded are widely used.

A V-CD recording/reproducing system is used as a composite product which is capable of reproducing not only V-CD but also audio CD and CDG. In order to record different information on the discs, different information processing methods inherent to each of the discs are applied.

At first, audio information data recorded on a CD may be reproduced by using program data recorded in P and Q channels. Information data recorded on CDG may be reproduced by using audio information data recorded in P and Q channels and graphic formation data recorded in R to W channels. Since audio information data and video information data recorded on V-CD are compressed and recorded by an MPEG algorism during recording, these may be reproduced by decoding the compressed audio/video information data via MPEG audio/video decoder during the playback operation.

The V-CD also includes different tracks on which different information data are recorded having a different data format from CD-ROM XA track on which general V-CD information data are selectively recorded. For example, at least one track is selectively allotted as a CD-DA track which is located inside a final track on a V-CD wherein MPEG audio/video signals have been processed and recorded by the MPEG algorism. In a case where a CD-DA track is allotted on the V-CD, it is necessary to check the allotted state of CD-DA track and reproduce information data appropriately in response to the checking. U.S. Pat. No. 5,321,677 describes an embodiment of searching a method for various kinds of information data recorded

in different tracks of a V-CD as described above.

In the V-CD having both an MPEG format track and a different track such as CD-DA track on which information data are recorded, according to a conventional method of searching different tracks, discrimination of the CD-DA track is performed by storing primary volume descriptor (PVD) in an additional storing place, e.g. static random access memory (SRAM). However, the conventional method has the problems in that the course of searching different tracks is complicated and that it wastes time.

SUMMARY OF THE INVENTION

Therefore, a first object of the present invention is to provide a method capable of automatically searching different tracks selectively allotted in a V-CD according to whether or not a CD-ROM XA synchronization signal is detected for the V-CD for a V-CD recording/reproducing system.

A second object of the present invention is to provide an apparatus capable of automatically searching different tracks selectively allotted in a V-CD according to whether or not a CD-ROM XA synchronization signal is detected for the V-CD for a V-CD recording/reproducing system.

In order to achieve the above-mentioned first object of the present invention, there is provided a method for searching different tracks in video compact disc recording/reproducing system using an optical pickup, the method comprising the steps of:

reading table-of-contents data recorded in a lead-in area of an optical disc which is loaded in the video compact disc recording/reproducing system;

deciding whether or not the optical disc is a video compact disc based on the read table-of-content data on the video compact disc, to read out information of video compact disc based on a track number and a track reproducing time information contained in the table-of-content data and to move the optical pickup to a final track in the video compact disc and read out data recorded on the final track, when the optical disc is the video compact disc; and

deciding whether or not a CD-ROM XA synchronous signal for the video compact disc is detected in the read-out data from the final track, when the CD-ROM XA synchronous signal is detected, the final track is decided as a track on which MPEG audio/video signal are recorded by a MPEG processing and a processing audio/video signal against the video compact disc, and when the CD-ROM XA synchronous signal is not detected, the final track is decided as the different track so that the optical pickup is moved to an inside track of the final track to read out data recorded on the inside track; and

deciding whether or not a CD-ROM XA synchronous signal for the video compact disc is detected in the read-out data from the inside track, when the CD-ROM XA synchronous signal is detected, the inside track is decided as a track on which MPEG audio/video signal are recorded by a MPEG processing and a processing audio/video signal against the video compact disc, and when the CD-ROM XA synchronous signal is not detected, the inside track is decided as the different track so that the optical pickup is moved to an inside track of the final track to return to the step reading out data recorded on the inside track.

In order to accomplish the above second object of the present invention, there is provided an apparatus for searching different tracks in a video compact disc recording/reproducing system, the apparatus comprising:
a data reading means for reading recorded information data from an optical disc which is loaded in a video compact disc recording/reproducing system, to output an audio/video data reading signal;
a preamplifier for amplifying the audio/video data reading signal which is supplied by the data reading means to output an amplified signal;
a digital signal processor for digital-processing the amplified signal from the preamplifier to output a first digital signal, a second digital signal, a third digital signal and a fourth digital signal;
a CDG encoder for encoding the first digital signal from the digital signal processor to output an encoded CDG signal;
a first D/A converter for converting the second digital signal and the fourth digital signal from the digital signal processor into a first analog signal and a second analog signal, respectively;
an MPEG processing section for processing the third digital signal from the digital signal processor by an MPEG algorism to output an MPEG audio/video signal;
a switch for switching between the CDG signal from the CDG encoder and the MPEG video signal from the MPEG processing section to outputs a video signal for a displaying device, and for switching between the first analog signal and the second analog signal from the first D/A converter and the MPEG audio signal from the MPEG processing section to output an audio signal for a sound generation device; and
a control section for controlling an operation of the data reading means, the digital signal processor, the MPEG processing section and the switch, for discriminating a kind of the optical disc which is loaded based on table-of-content data of the optical disc, the table-of-content being supplied through the digital signal processor from the data reading means, and for searching whether the different track is allotted on the video compact disc according to whether or not a CD-ROM XA synchronous signal for the video compact disc is detected when the optical disc is the video compact disc.

Preferably, the first digital signal is a compact disc graphics signal, both the second digital signal and the first analog signal are an audio compact signal, the third digital signal is an MPEG audio/video signal for the video compact disc, the fourth digital signal and the second analog signal are a CD-DA track signal of the video compact disc.

The different track searching method and apparatus decides what kind of disc is the loaded optical disc by reading TOC data recorded on lead-in of an optical disc, in case of V-CD, checks different rack is contained in the V-CD such as CD-DA track in accordance with whether the synchronous signal for V-CD is detected easily. Therefore, the present invention may be used to reproduce not only an audio CD, a CDG, a V-CD not also a V-CD having a CD-DA track.

BRIEF DESCRIPTION OF THE DRAWINGS

The above objects and advantages of the present invention will become more apparent by describing in detail a preferred embodiment thereof with reference to the attached drawings, in which:

FIG. 1 is a schematic diagram for explaining the data format of a V-CD which can be used in the present invention;

FIG. 2A is a view for illustrating the structure of a sector in a conventional CD;

FIG. 2B is a schematic diagram for illustrating the data format of the sector shown in FIG. 2A with respect to a CD-DA track;

FIG. 2C is a schematic diagram for illustrating the data format of the sector shown in FIG. 2A with respect to a CD-ROM XA track for a V-CD;

FIG. 3 is a block diagram for showing the configuration for a different track researching apparatus in a V-CD recording/reproducing system according to one embodiment of the present invention; and

FIG. 4 is a flow chart for illustrating a different track researching method in a V-CD recording/reproducing system according to one embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A description will be given below in detail, with reference to the accompanying drawings, of the mechanical structure, the circuitry configuration, and the operation of a different track researching method for a V-CD recording/reproducing system and an apparatus thereof according to an embodiment of the present invention.

FIG. 1 is a schematic diagram for explaining the data format of V-CD which can be used in the present invention. With reference to FIG. 1, generally, a V-CD has a lead-in area in which the table-of-contents (hereinafter referred to as "TOC") data are reproduced by a V-CD recording/reproducing system, a program area having at least one track on which MPEG audio/video data are recorded and at least one different track such as CD-DA track and lead-out area. The program area has at least one track. A first track includes a PVD area as a V-CD data track, a Karaoke Information Area (KIA) formed in a state which the video-song information is recorded on the corresponding disc, the V-CD information area, a Segment Play Item (SPI) area and a CD-I (Interactive) application area. The MPEG audio/video data compressed by the MPEG algorism are recorded on track 2 to track N. According to one case, at least one different track may be allotted inside the track N in which the CD-DA information data such as CD-DA track are recorded.

FIG. 2A illustrates the structure of a sector in a general CD. With reference to FIG. 2A, each sector of the CD is divided by 75 and reproduced for one second.

FIG. 2B is a schematic diagram for illustrating the data format of each sector shown in FIG. 2A with respect to the CD-DA track. With reference to FIG. 2B, one track of CD-DA track is composed of an audio data (2352 bytes).

FIG. 2C is a schematic diagram for illustrating the data format of each sector shown in FIG. 2A with respect to the CD-ROM XA track for the V-CD. With reference to FIG. 2C, one track of a CD-ROM XA track for the V-CD has 2352 bytes as in the

CD-DA track, which is composed of a synchronous signal (12 bytes), a header data (4 bytes), a sub-header data (8 bytes), a user' data (324 bytes) and an error detection code EDC (4 bytes).

FIG. 3 is a block diagram for showing the configuration for different tracks researching apparatus in V-CD recording/reproducing system according to the present invention. With reference to FIG. 3, a reference numeral 100 denotes an optical disc which is reproduced by a V-CD recording/reproducing system. A data reading section 31 comprises a spindle motor 311, a servo circuit 312 and an optical pickup 313, which reads the recorded information data from optical disc 100 and outputs an RF MPEG audio/video reading signal 314. Spindle motor 311 rotates optical disc 100 at a constant speed under the control operation of a control section 38 to be described later, so that optical disc 100 is reproduced normally. Optical pickup 313 reads out information from the optical disc 100 which is rotated at a constant speed. Servo circuit 312 controls drive of spindle motor 411 and movements of the optical pickup 313.

A preamplifier 32 amplifies audio/video data reading signal 314 supplied from optical pickup 313 and outputs amplified signal 321.

A digital signal processor (DSP) 33 digital-processes amplified signal 321 from preamplifier 32 and outputs a CDG signal 331, an audio CD signal 332, an MPEG audio/video signal 333 recorded on the V-CD and a CD-DA signal 334 in case of a CD-DA track which is allotted in the V-CD.

A CDG encoder 34 encodes the CDG signal 331 from DSP 33 and outputs the encoded CDG signal 341.

A first D/A converter 35 converts an audio CD signal 4511 and a CD-DA track signal 334 selectively allotted in the V-CD 334 into a first analog signal 351 and a second analog signal 3511.

An MPEG processing section 36 includes a CD-ROM decoder 361, a MPEG audio decoder 362, a second D/A converter 363, an MPEG audio decoder 364 and a video signal converter/encoder 365, which processes an MPEG audio/video signal 333 of the V-CD provided from DSP 33 by the MPEG algorism and outputs a first MPEG signal 3631 and a second MPEG signal 3651. A CD-ROM decoder 361 decodes MPEG audio/video signal 333 suitable for the CD-ROM data format and outputs decoded MPEG signal 3611. MPEG audio decoder 362 decodes MPEG audio signal 36111 of CD-ROM decoded MPEG signal 3611 through CD-ROM decoder 361 in accordance with the predetermined audio synchronous clock and outputs the decoded MPEG audio signal 3621. Second D/A converter 363 analog-converts the decoded MPEG audio signal 3621 by MPEG audio decoder 361 and outputs the analog-converted MPEG audio signal 3631. MPEG video decoder 364 decodes MPEG video signal 36112 of CD-ROM decoded MPEG signal 3611 through CD-ROM decoder 361 in accordance with the predetermined video synchronous clock and outputs the decoded MPEG video signal 3641. Video signal converter/encoder 365 analog-converts the decoded MPEG video signal 3641 from MPEG video decoder 364 and encodes it to output the analog-converted/encoded MPEG video signal 3651.

A switch 37 switch between encoded CDG signal 341 from CDG encoder 34 and analog-converted/encoded MPEG video signal 3651 from MPEG processing section 36 to outputs a video signal for a displaying device, and switch between the first signal 351 and second signal 3511 from first D/A converter 35 and the analog-converted MPEG audio signal 3631 from MPEG processing section 36 to output an audio signal for a sound generation device.

A control section 38 controls the operation of data reading section 31, DSP 33, MPEG processing section 36 and switch 37, discriminates the kind of optical disc 100 which is loaded based on the TOC data of optical disc 100, the TOC data are supplied through DSP 33 from data reading section 31, and searches whether the different track is allotted on the V-CD according to whether or not a CD-ROM XA synchronous signal for the V-CD is detected when the optical disc 100 is the V-CD. The TOC data are supplied through DSP 33 from data reading section 31.

A description will be given below in detail to the operation of different tracks searching apparatus for a V-CD recording/reproducing system as mentioned above.

At first, an optical disk 100 is loaded on the V-CD recording/reproducing system 4 by a user. Then, spindle motor 311 rotates optical disc 100 under the control of control section 38 on the basis of spindle control signal 3121 from servo circuit 312 of data reading section 31.

Accordingly, optical pickup 313 reads TOC data recorded at the lead-in area of optical disk 100 and outputs RF TOC reading signal 314.

Then, preamplifier 32 amplifies TOC reading sinal 314 from optical pickup 313 and outputs amplified TOC signal 321. Then, DPS 33 processes an amplified TOC signal 321 into a digital TOC signal. Then, control section 38 checks whether SPEC of A0 in Q channel of sud-code from the digital TOC sinal is $20 indicating CD-ROM XA.

As a result of the decision, if optical disk 100 is CDG, CDG encoder 34 encodes 331 provided through DPS 33 from data reading section 31 and outputs a CDG signal 341 as screen displaying signal. Then, CDG signal 341 is outputted through switch 37 under of control section 38.

As a result of the decision, if optical disk 100 is audio CD, first D/A converter 35 analog-converts CD recording information signal 331 provided through DPS 33 from data reading section 31 and outputs analog-converted signal 351. Then, analog-converted signal 351 is outputted through switch 37 under of control section 38.

On the other hand, when control section 38 checks whether PSEC of A0 in Q channel of sud-code from the digital TOC sinal is $20, if the optical disc 100 is a V-CD, control section 38 control switch 37 switching path to be switched toward MPEG processing section 36, then optical pickup 313 executes playback operation using the PVD area in track 1.

That is, optical pickup 313 reads recorded data from the V-CD and outputs an audio/video data reading signal 314. Then, preamplifier 32 amplifies audio/video

data reading signal 314 from optical pickup 313 and outputs an amplified signal 321. DSP 33 digital-processes amplified signal 321 from preamplifier 32 and outputs MPEG audio/video signals.

Subsequently, CD-ROM decoder 361 decodes MPEG audio/video signal 333 suitable for the CD-ROM data format and outputs the decoded MPEG signal 3611.

MPEG audio decoder 362 decodes MPEG audio signal 36111 of CD-ROM decoded MPEG signal 3611 through CD-ROM decoder 361 in accordance with the predetermined audio synchronous clock and outputs the decoded MPEG audio signal 3621. Second D/A converter 363 analog-converts decoded MPEG audio signal 3621 by MPEG audio decoder 361 and outputs analog-converted MPEG audio signal 3631 to be outputted through a sound output device (not shown).

Also, MPEG video decoder 364 decodes MPEG video signal 36112 of CD-ROM decoded MPEG signal 3611 through CD-ROM decoder 361 in accordance with the predetermined video synchronous clock and outputs the decoded MPEG video signal 3641. A video signal converter/encoder 363 analog-converts decoded MPEG video signal 3641 from MPEG video decoder 364 as color signal of R (Red), G (Green), B (Blue) to be displayed on a CRT (not shown) and encodes it as an image displaying signal and outputs the analog-converted/encoded MPEG video signal 3651. Accordingly, analog-converted/encoded MPEG video signal 3651 is outputted through switch 37 to the CRT under control of control section 38.

A switch 37 switch between encoded CDG signal 341 from CDG encoder 34 and analog-converted/encoded MPEG video signal 3651 from MPEG processing section 36 to output a video signal for a displaying device, and switch between the audio CD signal 351 and CD-DA signal from first D/A converter 35 and the analog-converted MPEG audio signal 3631 from said MPEG processing section 36 to output an audio signal for a sound generation device.

A description will be given below in detail, with reference to FIG. 4, the operation of a different track researching method for V-CD recording/reproducing system according to an embodiment of the present invention.

If optical disc 100 is loaded on V-CD recording/reproducing system 3 by user, optical pickup 313 reads TOC data recorded in a lead-in area of optical disc 100 under control of control section 38 at step S1.

Then control section 38 checks whether PSEC of A0 in Q channel of subcode from read TOC data is $20 indicating CD-ROM XA at step S2.

As a result of the decision at step S1, if PSEC of A0=$20, optical disc 100 is decided as V-CD and control section 38 recognizes information of V-CD on the basis of track number and track reproducing time information contained in the TOC data at step S3.

Subsequently, control section 38 moves optical pickup 313 to a final track of V-CD, that is track N, by controlling servo circuit 312, thereby optical pickup 313 reads data in recorded in the track N at step S4. According to it, the reader data are amplified by RF amplifier 32 and processed by DSP 33.

Then control section 38 checks whether CD-ROM XA synchronous signal for V-CD is detected from RF sinal provided by DSP 33 at step S5.

As a result of the check at step S5, if CD-ROM XA synchronous signal for V-CD is detected from sinal provided by DSP, the track N is decided as the track on which MPEG audio/video information by MPEG processing are recorded. That is, the V-CD is decided on which CD-DA track is not included at step S10.

On the other hand, as a result of the check at step S5, if CD-ROM XA synchronous signal for a V-CD is not detected from RF sinal provided by DSP, the track N is decided as a CD-DA track (step S6), moves optical pickup 313 from track N to track N-1 of reading data (step S7), and checks whether a CD-ROM XA synchronous signal for V-CD is detected from track N-1 at step S8.

As a result of the check at step S8, if a CD-ROM XA synchronous signal for V-CD is detected from the track N-1, the track N-1 is decided a track on which MPEG audio/video information and thereby the V-CD is processed by MPEG processing section 34 at step S10. If a CD-ROM XA synchronous signal for V-CD is not detected from track N-1, the track N-1 is decided a CD-DA track (step S9) and returned to step S7. And then control section 38 reads information data from an inside track of track N-1, that is track N-2, and checks whether a CD-ROM XA synchronous signal for V-CD is detected from the track N-2 at step S8.

Then, control section 38 checks whether a CD-DA track is contained on the loaded V-CD. If the CD-DA track is contained, the CD-DA track is switched an output path of which from MPEG processing section 36 to first D/A converter 35 under the control of control section 38 to switch 37.

According to the present invention, in a V-CD recording/reproducing system, the different track method and apparatus decides what kind of disc is the loaded optical disc by reading TOC data recorded on lead-in of an optical disc, in case of V-CD, checks if a different track is contained in the V-CD such as CD-DA track in accordance with whether the synchronous signal for V-CD is detected easily. Therefore, the present invention may be used to reproduce not only an audio CD, a CDG, a V-CD but also a V-CD having a CD-DA track.

As described above, although illustrative embodiments of the present invention have been described in detail herein, it is to be understood that the invention is not limited to those precise embodiments, and that various changes and modifications may be effected herein by one skilled in the art without departing from the scope or spirit of the invention.

Different track searching method for video compact disc recording/reproducing system and apparatus thereof

Claims of correspondent: US5701384

What is claimed is:

1. A method for searching a different track in a video compact disc recording/reproducing system using an optical pickup, said method comprising the steps of:
reading table-of-contents data recorded in a lead-in area of an optical disc which is loaded in the video compact disc recording/reproducing system;
deciding whether or not the optical disc is a video compact disc based on the read table-of-content data on the video compact disc, to read out information of video compact disc based on a track number and a track reproducing time information contained in the table-of-content data and to move the optical pickup to a final track in the video compact disc and read out data recorded on the final track, when the optical disc is the video compact disc; and
deciding whether or not a CD-ROM XA synchronous signal for the video compact disc is detected in the read-out data from the final track, when the CD-ROM XA synchronous signal is detected, the final track is decided as a track on which MPEG audio/video signal are recorded by a MPEG processing and a processing audio/video signal against the video compact disc, and when the CD-ROM XA synchronous signal is not detected, the final track is decided as the different track so that the optical pickup is moved to an inside track of the final track to read out data recorded on the inside track; and
deciding whether or not a CD-ROM XA synchronous signal for the video compact disc is detected in the read-out data from the inside track, when the CD-ROM XA synchronous signal is detected, the inside track is decided as a track on which MPEG audio/video signal are recorded by a MPEG processing and a processing audio/video signal against the video compact disc, and when the CD-ROM XA synchronous signal is not detected, the inside track is decided as the different track so that the optical pickup is moved to an inside track of the final track to return to the step reading out data recorded on the inside track.

2. An apparatus for searching a different track of a video compact disc, said apparatus comprising:
a data reading means for reading recorded information data from an optical disc which is loaded in a video compact disc recording/reproducing system, to output an audio/video data reading signal;
a preamplifier for amplifying the audio/video data reading signal which is supplied by the data reading means to output an amplified signal;
a digital signal processor for digital-processing the amplified signal from said preamplifier to output a first digital signal, a second digital signal, a third digital signal and a fourth digital signal;
a CDG encoder for encoding the first digital signal from said digital signal processor to output an encoded CDG signal;
a first D/A converter for converting the second digital signal and the fourth digital signal from said digital signal processor into a first analog signal and a second

analog signal, respectively;
an MPEG processing section for processing the third digital signal from said digital signal processor by an MPEG algorism to output an MPEG audio/video signal;
a switch for switching between the CDG signal from said CDG encoder and the MPEG video signal from said MPEG processing section to output a video signal for a displaying device, and for switching between the first analog signal and the second analog signal from said first D/A converter and the MPEG audio signal from said MPEG processing section to output an audio signal for a sound generation device; and
a control section for controlling an operation of said data reading means, said digital signal processor, said MPEG processing section and said switch, for discriminating a kind of the optical disc which is loaded based on table-of-content data of the optical disc, the table-of-content being supplied through the digital signal processor from said data reading means, and for searching whether the different track is allotted on the video compact disc according to whether or not a CD-ROM XA synchronous signal for the video compact disc is detected when the optical disc is the video compact disc.

3. The apparatus for searching a different track of a video compact disc as claimed in claim 2, wherein the first digital signal is a compact disc graphics signal, both the second digital signal and the first analog signal are an audio compact signal, the third digital signal is an MPEG audio/video signal for the video compact disc, the fourth digital signal and the second analog signal are a CD-DA track signal of the video compact disc.

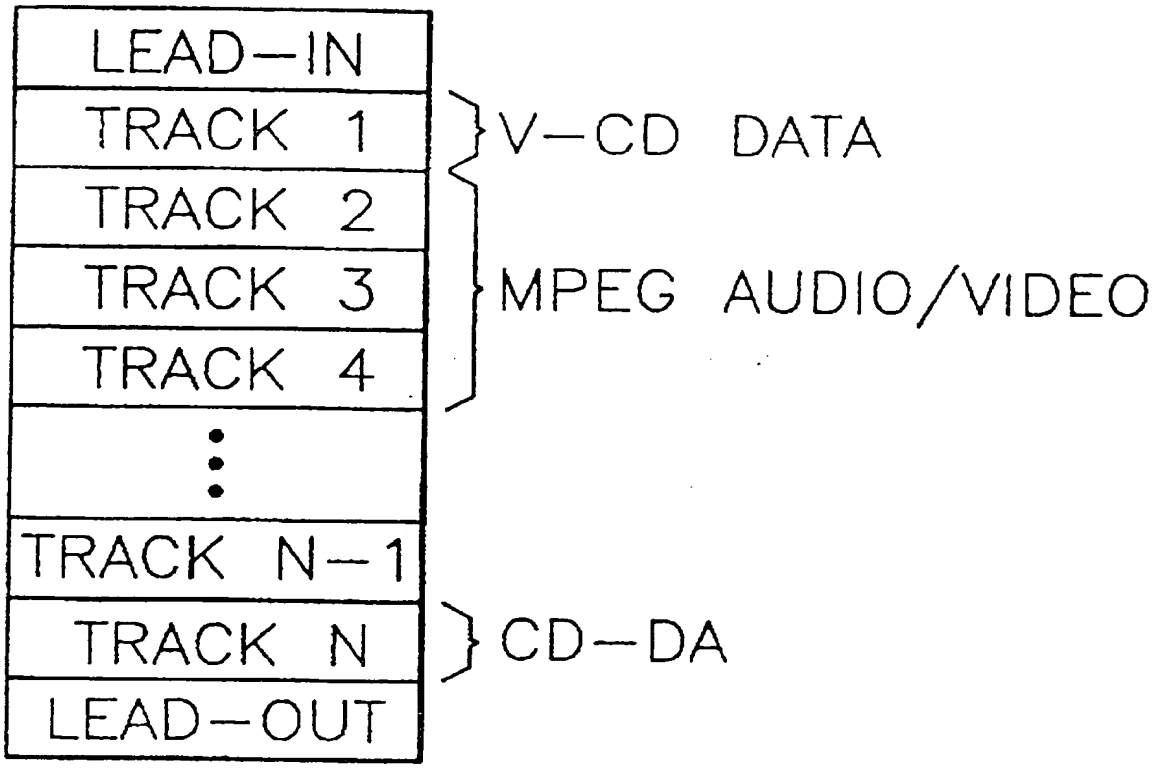

LEAD-IN
TRACK 1
TRACK 2
TRACK 3
TRACK 4
TRACK N-1
TRACK N
LEAD-OUT
V-CD DATA
MPEG AUDIO/VIDEO
CD-DA

FIG. 1

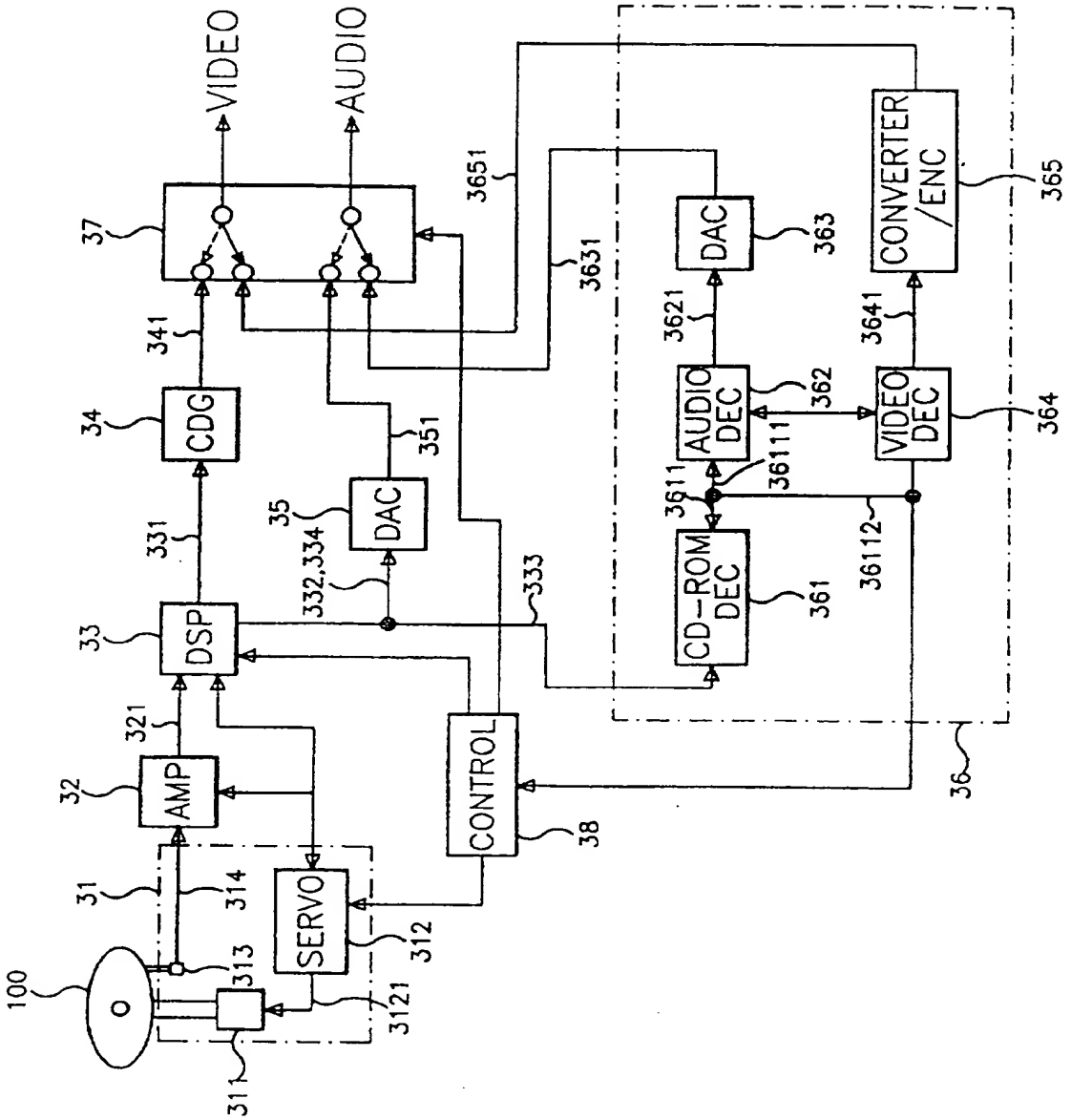
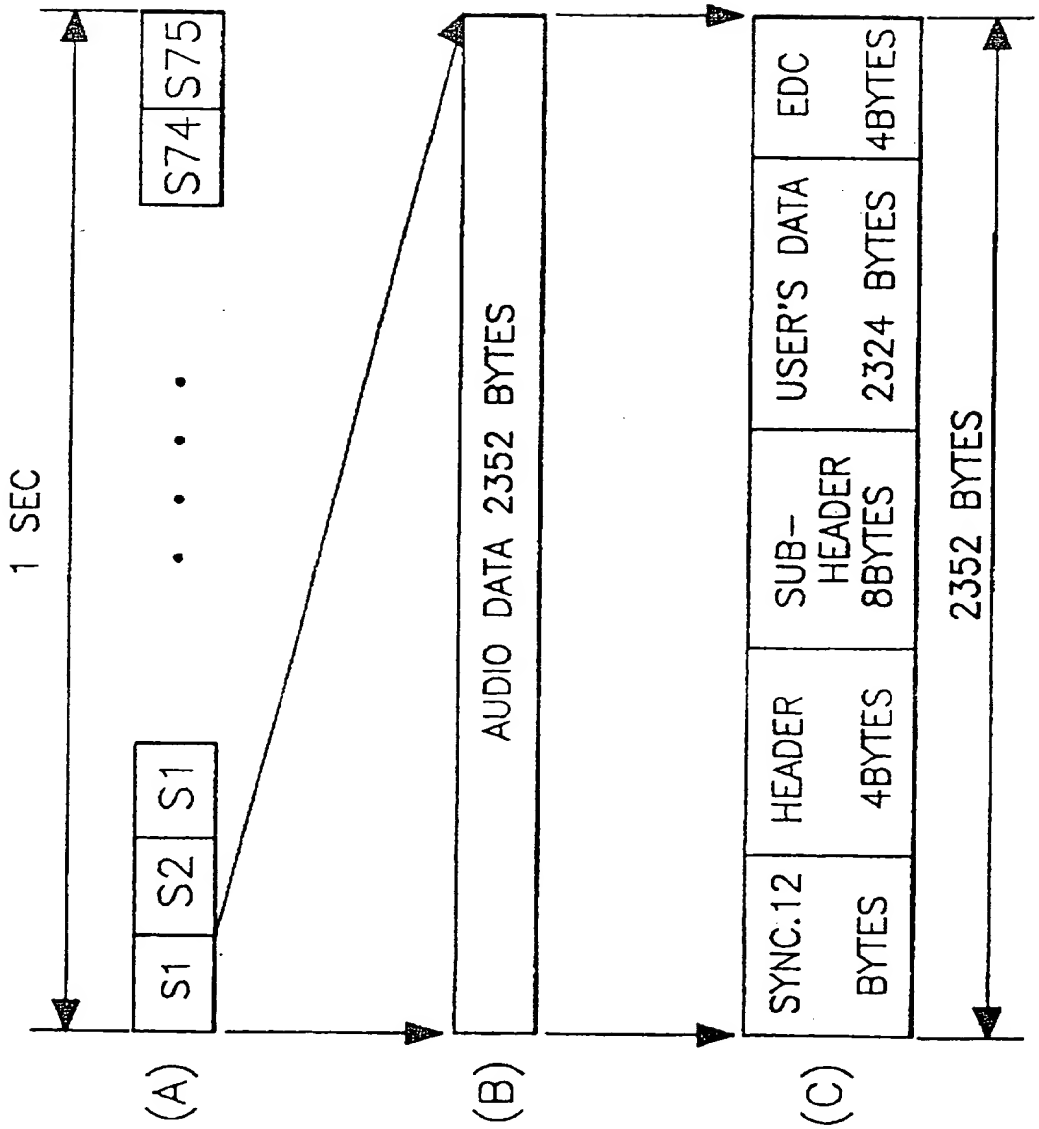

VIDEO
AUDIO
37
341
34
CDG
331
33
DSP
321
32
AMP
31
314
313
100
SERVO
312
3121
311
351
35
DAC
332,334
333
CONTROL
38
3651
3631
DAC
363
3621
AUDIO DEC
362
3611
36111
CD-ROM DEC
361
CONVERTER /ENC
365
3641
VIDEO DEC
364
36112
36

FIG. 3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S1
S2
S1
S74
S75
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(B)
SYNC.12 BYTES
HEADER 4BYTES
SUB-HEADER 8BYTES
USER'S DATA 2324 BYTES
EDC 4BYTES
2352 BYTES
(C)

FIG.2